

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-078359

(43)Date of publication of application : 18.03.1994

(51)Int.Cl.

H04Q 7/04

(21)Application number : 04-225702

(71)Applicant : FUJITSU LTD

(22)Date of filing : 25.08.1992

(72)Inventor : TAKENAKA TETSUYOSHI
NAKAMURA TADASHI

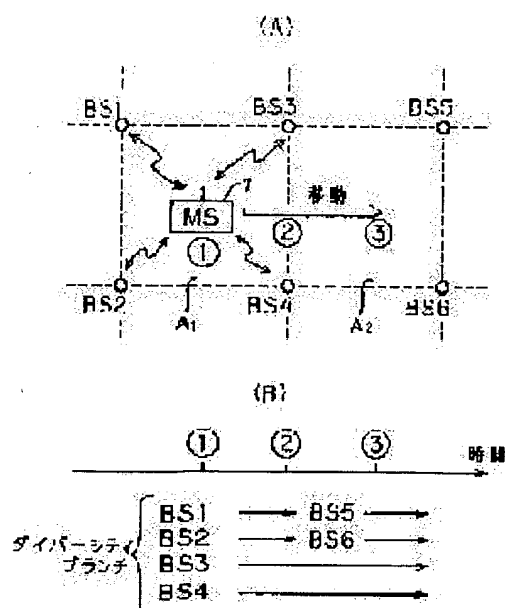
(54) RADIO LINE CONTROL METHOD

(57)Abstract:

PURPOSE: To prevent a hit by selecting a base station in common to base stations forming a zone just before hand-off and base stations forming a zone just after as a branch of route diversity before and after the hand-off.

CONSTITUTION: When a mobile station MS7 during communication moves to a position (2), that is, from a duplicate zone A1 to A2, the MS7 moves to the duplicate zone A2 shown in (3) after hand-off. In this case, base stations BS3, BS4 forming in common the zone A1 before hand-off and the zone A2 after hand-off are selected as the branches for route diversity after and before the hand-off. Thus, the MS7 is in line connection to either a BS3 or a BS4 just before the hand-off for communication and then the hand-off is implemented. As

a result, since the MS 7 is in line connection with the same base station just before and just after the hand-off and hand-off is implemented, the hit of the communication at hand-off is prevented.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of

rejection]

[Kind of final disposal of application other than
the examiner's decision of rejection or
application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's
decision of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] Since a hand off is made like **** according to this invention where the line connection of the mobile station is carried out to the same base station just before a hand off and immediately after, it has the features of being able to prevent the hits of the communication link at the time of a hand off.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] If circuit quality deteriorates in the wireless line control approach of the conventional mobile radio communication system when the mobile station is communicating with one certain base station. For example, a mobile station reports circuit quality degradation to a base station control station, and a base station control station carries out measurement of the received field strength between the mobile station, and a report of the measurement result to the base station of the mobile station circumference by that cause. Said hand off was performed by switching a circuit to the base station which has the maximum received field strength among the measurement result.

[0004] On the other hand, the wireless zone of a base station is made into the minimum, and the wireless zone of two or more base stations is overlapped, respectively, and the route diversity which chooses the base station where the largest received electrical potential difference is obtained among the base stations which have the wireless zone where the mobile station carries out the ** area of the node of one mobile station is known conventionally.

[0005] For example, zone A1 where each wireless zone of (base station BS) 1-4 overlaps [a mobile station (MS) 7] as shown in drawing 3 Zone A2 where each wireless zone of BS 3-6 overlaps via inner location ** to **. In the case so that it may move to inner location ** **. In a location, BS with the largest received electrical potential difference is chosen among BS1-BS4, and BS with the largest received electrical potential difference is chosen among BS3-BS6 in the location of **. thus -- route diversity -- each -- BS1-BS6 tend to be made into the branch of a diversity, and it is going to enable the communication link of homogeneous quality over large area. Therefore, at route diversity, there was no concept of the above mentioned hand off conventionally.

[Translation done.]

* NOTICES *

JPO and NCIPPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, since it was switched before and after the hand off in said conventional approach by the communication link between completely independent base stations, the hits of the communication link might be carried out for the mobile station. Moreover, at the conventional route diversity, it is the duplication zone A1 of drawing 3. When MS7 carries out a ** area, the received electrical potential difference of BS1 or BS2 most to (**) in size Duplication zone A2 When MS7 carries out a ** area, the received electrical potential difference of BS5 or BS6 size most to (**) when becoming Duplication zone A1 A2 When MS7 was located in the location of ** of a boundary, since a circuit change was performed to BS5 from BS1 or BS2, or BS6, hits might arise. [0007] This invention aims at offering the wireless line control approach which solved the above-mentioned technical problem by performing branch selection so that the base station which was made in view of the above point and serves as a common branch before and behind a hand off may exist.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] Drawing 1 shows drawing explaining the principle of this invention. duplication zone A1 where, as for this invention, each wireless zone of (base station BS) 1-4 overlaps from -- duplication zone A2 where each wireless zone of (base station BS) 3-6 overlaps At the time of the hand off at the time of a mobile station (MS) 7 shifting Duplication zone A1 in front of a hand off The base stations 1-4 to constitute and duplication zone A2 just behind a hand off The common base stations 3 and 4 are chosen as a branch of the route diversity before and behind a hand off among the base stations 3-6 to constitute.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

OPERATION

[Function] In route diversity, an operation of this invention in selection composition of choosing a branch with the most sufficient circuit quality is explained with drawing 1 (A) and (B).

[0010] As ** shows the mobile radio communication system which adopts route diversity to drawing 1 (A), MS7 is the duplication zone A1. When you carry out a ** area, as ** shows to this drawing (B), let BS1-BS4 of the MS7 circumference be the branch of a connection place.

[0011] MS7 under communication link -- moving -- the location A1, i.e., the duplication zone, of ** of drawing 1 (A) from -- A2 Duplication zone A2 which shows MS7 by ** after a hand off is performed, when shifting It moves inside.

[0012] Here, by this invention, by location [of a hand off] **, as shown in drawing 1 (B), BS1 and BS2 are switched to BS5 and BS6 as a branch of a connection place, and BS3 and BS4 are taken as the branch of a connection place as it is. And location ** after a hand off is also the duplication zone A2. Let BS3-BS6 to constitute be the branch of a connection place.

[0013] That is, at this invention, it is the duplication zone A1 in front of a hand off. Duplication zone A2 after a hand off By choosing BS3 and BS4 which are constituted in common before and behind a hand off as a branch of route diversity, a hand off can be performed just before a hand off, carrying out the line connection of either and MS7 among BS3 or BS4, and communicating.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EXAMPLE

[Example] Drawing 2 shows the explanatory view of one example of this invention of operation. Drawing 2 (A) shows the location of a base station, a wireless zone, and the migration locus of a mobile station (MS) 7. Among this drawing (A), the white round mark shall show the base station (BS), and shall show a location by x and the y-coordinate. The square formed by the broken line shows the duplication zone where each wireless zone of the base station in the location of the four top-most vertices overlaps.

[0015] A mobile station (MS) 7 is **->**->**-> as shown in drawing 2 (A). -- It is the order of ->**, namely, they are the duplication zone B1, B-2, B3, and B4. And B5 It shall move in order. Moreover, each base station, a mobile station, and a communication link are possible for a control station 11, it judges the location of MS7 from the measurement result of the received field strength from a base station, and makes a diversity branch four base stations which are received field strength and which become size.

[0016] Next, actuation of this example is explained. As MS7 shows by ** first, it is the duplication zone B1. When carrying out a ** area inside, it is the duplication zone B1. Let four BS (1 2), BS (2 2), BS (1 3), and BS (2 3) to constitute be diversity branches. Then, when MS7 moves and it comes to the location of ** of drawing 2 (A), the location of ** is the duplication zone B1. B-2 It is a boundary location, and immediately after MS7 passes through the location of **, a hand off is started from MS7 or surrounding BS to a control station 11.

[0017] Then, a control station 11 leaves BS whose received field strength is two [strongest] as a diversity branch, chooses two games from other things which have the high received field strength out of surrounding BS, and is usually taken as a new branch. MS7 so that drawing 2 (A) may show in the location of ** Namely, BS (2 2), BS whose above-mentioned received field strength is two [strongest] since it is in the distance nearest to BS (2 3) is these [BS (2 2) and BS (2 3)], and two games besides the above are duplication zone B-2. It is (3, 3), two games (3 2), i.e., BS, of the remainder to constitute.

[0018] By this example, since the line connection of MS7 is carried out to BS (2 2) or BS (2 3) at least just before the location of **, here ** Since the above-mentioned hand off is performed immediately after passing through a location, and the circuit change of BS (2 2) and BS (2 3) is not performed even if BS (1 2) and BS (1 3) are switched to BS (3 2) and BS (3 3) It does not produce un-arranging, such as hits of the communication link at the time of a hand off.

[0019] immediately after similarly MS7 passes through the location of ** of drawing 2 (A) -- duplication zone B-2 from -- B3 Although a hand off is started since it shifted Duplication zone B-2 Four BS and duplication zones B3 to constitute Two BS which is common among four BS to constitute, i.e., BS (2 3) and BS (3 3), is made into the branch of route diversity. And duplication zone B3 of a migration place Let BS (3 4) and BS (2 4) which are constituted with BS (2 3) and BS (3 3) be the branch of route diversity.

[0020] The base station used as the branch of route diversity becomes as [show / in drawing 2 (B) / typically] by performing line connection control like the above hereafter.

[0021] Thus, according to this example, in order to communicate considering a common base station as

a branch of route diversity before and behind a hand off, the hits of the communication link at the time of a hand off can be prevented.

[0022] In addition, application is not limited to the zone of the above-mentioned square, and this invention can also be applied to wireless zones of the configuration of arbitration, such as a zone of the polygon on two-dimensional flat surfaces, such as a triangle and a hexagon, and a wireless zone of the three-dimensional structure in a building.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the principle explanatory view of this invention.

[Drawing 2] It is the explanatory view of one example of this invention of operation.

[Drawing 3] It is the explanatory view of an example of the conventional wireless line control approach.

[Description of Notations]

1-6 Base station (BS)

7 Mobile Station (MS)

11 Control Station

A1, A2, B1 - B5 Duplication zone of a wireless zone

[Translation done.]

* NOTICES *

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the wireless line control approach in the mobile radio communication system which is applied to the wireless line control approach, especially performs route diversity.

[0002] In mobile radio communication system, such as a land mobile radiotelephone and a cellular phone, in order that a mobile station may move also during a message, the processing of the so-called hand off which the communication link with the base station where the mobile station was communicating till then may become difficult, newly discovers a nearby base station in that case, and switches a line connection is needed. No hits of a message are wanted for there to be on the occasion of this hand off.

[0003]

[Description of the Prior Art] If circuit quality deteriorates in the wireless line control approach of the conventional mobile radio communication system when the mobile station is communicating with one certain base station For example, a mobile station reports circuit quality degradation to a base station control station, and a base station control station carries out measurement of the received field strength between the mobile station, and a report of the measurement result to the base station of the mobile station circumference by that cause. Said hand off was performed by switching a circuit to the base station which has the maximum received field strength among the measurement result.

[0004] On the other hand, the wireless zone of a base station is made into the minimum, and the wireless zone of two or more base stations is overlapped, respectively, and the route diversity which chooses the base station where the largest received electrical potential difference is obtained among the base stations which have the wireless zone where the mobile station carries out the ** area of the node of one mobile station is known conventionally.

[0005] For example, zone A1 where each wireless zone of (base station BS) 1-4 overlaps [a mobile station (MS) 7] as shown in drawing 3 Zone A2 where each wireless zone of BS 3-6 overlaps via inner location ** to ** In the case so that it may move to inner location ** ** In a location, BS with the largest received electrical potential difference is chosen among BS1-BS4, and BS with the largest received electrical potential difference is chosen among BS3-BS6 in the location of **. thus -- route diversity -- each -- BS1-BS6 tend to be made into the branch of a diversity, and it is going to enable the communication link of homogeneous quality over large area. Therefore, at route diversity, there was no concept of the above mentioned hand off conventionally.

[0006]

[Problem(s) to be Solved by the Invention] However, since it was switched before and after the hand off in said conventional approach by the communication link between completely independent base stations, the hits of the communication link might be carried out for the mobile station. Moreover, at the conventional route diversity, it is the duplication zone A1 of drawing 3 . When MS7 carries out a ** area, the received electrical potential difference of BS1 or BS2 most to (**) in size Duplication zone A2

When MS7 carries out a ** area, the received electrical potential difference of BS5 or BS6 size most to (**) when becoming Duplication zone A1 A2 When MS7 was located in the location of ** of a boundary, since a circuit change was performed to BS5 from BS1 or BS2, or BS6, hits might arise. [0007] This invention aims at offering the wireless line control approach which solved the above-mentioned technical problem by performing branch selection so that the base station which was made in view of the above point and serves as a common branch before and behind a hand off may exist.

[0008]

[Means for Solving the Problem] Drawing 1 shows drawing explaining the principle of this invention. duplication zone A1 where, as for this invention, each wireless zone of (base station BS) 1-4 overlaps from -- duplication zone A2 where each wireless zone of (base station BS) 3-6 overlaps At the time of the hand off at the time of a mobile station (MS) 7 shifting Duplication zone A1 in front of a hand off The base stations 1-4 to constitute and duplication zone A2 just behind a hand off The common base stations 3 and 4 are chosen as a branch of the route diversity before and behind a hand off among the base stations 3-6 to constitute.

[0009]

[Function] In route diversity, an operation of this invention in selection composition of choosing a branch with the most sufficient circuit quality is explained with drawing 1 (A) and (B).

[0010] As ** shows the mobile radio communication system which adopts route diversity to drawing 1 (A), MS7 is the duplication zone A1. When you carry out a ** area, as ** shows to this drawing (B), let BS1-BS4 of the MS7 circumference be the branch of a connection place.

[0011] MS7 under communication link -- moving -- the location A1, i.e., the duplication zone, of ** of drawing 1 (A) from -- A2 Duplication zone A2 which shows MS7 by ** after a hand off is performed, when shifting It moves inside.

[0012] Here, by this invention, by location [of a hand off] **, as shown in drawing 1 (B), BS1 and BS2 are switched to BS5 and BS6 as a branch of a connection place, and BS3 and BS4 are taken as the branch of a connection place as it is. And location ** after a hand off is also the duplication zone A2. Let BS3-BS6 to constitute be the branch of a connection place.

[0013] That is, at this invention, it is the duplication zone A1 in front of a hand off. Duplication zone A2 after a hand off By choosing BS3 and BS4 which are constituted in common before and behind a hand off as a branch of route diversity, a hand off can be performed just before a hand off, carrying out the line connection of either and MS7 among BS3 or BS4, and communicating.

[0014]

[Example] Drawing 2 shows the explanatory view of one example of this invention of operation. Drawing 2 (A) shows the location of a base station, a wireless zone, and the migration locus of a mobile station (MS) 7. Among this drawing (A), the white round mark shall show the base station (BS), and shall show a location by x and the y-coordinate. The square formed by the broken line shows the duplication zone where each wireless zone of the base station in the location of the four top-most vertices overlaps.

[0015] A mobile station (MS) 7 is **->**->**-> as shown in drawing 2 (A). -- It is the order of ->**, namely, they are the duplication zone B1, B-2, B3, and B4. And B5 It shall move in order. Moreover, each base station, a mobile station, and a communication link are possible for a control station 11, it judges the location of MS7 from the measurement result of the received field strength from a base station, and makes a diversity branch four base stations which are received field strength and which become size.

[0016] Next, actuation of this example is explained. As MS7 shows by ** first, it is the duplication zone B1. When carrying out a ** area inside, it is the duplication zone B1. Let four BS (1 2), BS (2 2), BS (1 3), and BS (2 3) to constitute be diversity branches. Then, when MS7 moves and it comes to the location of ** of drawing 2 (A), the location of ** is the duplication zone B1. B-2 It is a boundary location, and immediately after MS7 passes through the location of **, a hand off is started from MS7 or surrounding BS to a control station 11.

[0017] Then, a control station 11 leaves BS whose received field strength is two [strongest] as a

diversity branch, chooses two games from other things which have the high received field strength out of surrounding BS, and is usually taken as a new branch. MS7 so that drawing 2 (A) may show in the location of **. Namely, BS (2 2), BS whose above-mentioned received field strength is two [strongest] since it is in the distance nearest to BS (2 3) is these [BS (2 2) and BS (2 3)], and two games besides the above are duplication zone B-2. It is (3, 3), two games (3 2), i.e., BS, of the remainder to constitute. [0018] By this example, since the line connection of MS7 is carried out to BS (2 2) or BS (2 3) at least just before the location of **, here ** Since the above-mentioned hand off is performed immediately after passing through a location, and the circuit change of BS (2 2) and BS (2 3) is not performed even if BS (1 2) and BS (1 3) are switched to BS (3 2) and BS (3 3) It does not produce un-arranging, such as hits of the communication link at the time of a hand off.

[0019] immediately after similarly MS7 passes through the location of ** of drawing 2 (A) -- duplication zone B-2 from -- B3 Although a hand off is started since it shifted Duplication zone B-2 Four BS and duplication zones B3 to constitute Two BS which is common among four BS to constitute, i.e., BS (2 3) and BS (3 3), is made into the branch of route diversity. And duplication zone B3 of a migration place Let BS (3 4) and BS (2 4) which are constituted with BS (2 3) and BS (3 3) be the branch of route diversity.

[0020] The base station used as the branch of route diversity becomes as [show / in drawing 2 (B) / typically] by performing line connection control like the above hereafter.

[0021] Thus, according to this example, in order to communicate considering a common base station as a branch of route diversity before and behind a hand off, the hits of the communication link at the time of a hand off can be prevented.

[0022] In addition, application is not limited to the zone of the above-mentioned square, and this invention can also be applied to wireless zones of the configuration of arbitration, such as a zone of the polygon on two-dimensional flat surfaces, such as a triangle and a hexagon, and a wireless zone of the three-dimensional structure in a building.

[0023]

[Effect of the Invention] Since a hand off is made like **** according to this invention where the line connection of the mobile station is carried out to the same base station just before a hand off and immediately after, it has the features of being able to prevent the hits of the communication link at the time of a hand off

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention relates to the wireless line control approach in the mobile radio communication system which is applied to the wireless line control approach, especially performs route diversity.

[0002] In mobile radio communication system, such as a land mobile radiotelephone and a cellular phone, in order that a mobile station may move also during a message, the processing of the so-called hand off which the communication link with the base station where the mobile station was communicating till then may become difficult, newly discovers a nearby base station in that case, and switches a line connection is needed. No hits of a message are wanted for there to be on the occasion of this hand off.

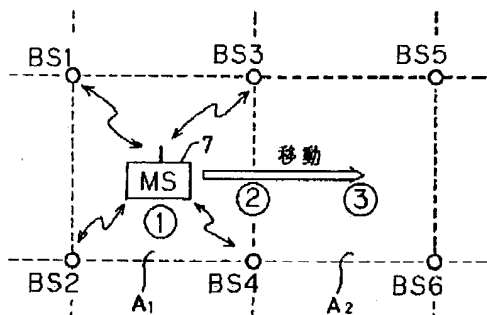
[Translation done.]

DRAWINGS

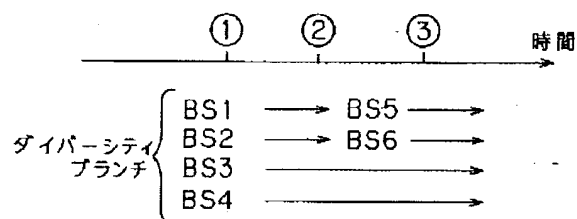
[Drawing 1]

本発明の原理説明図

(A)



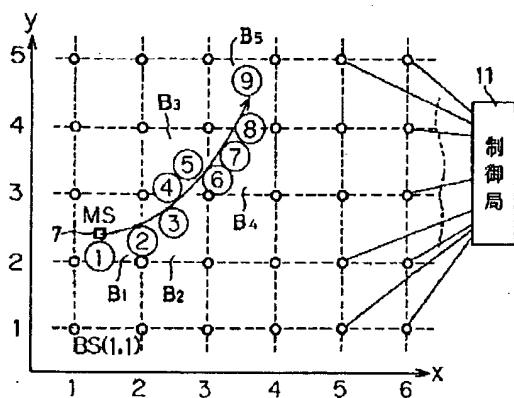
(B)



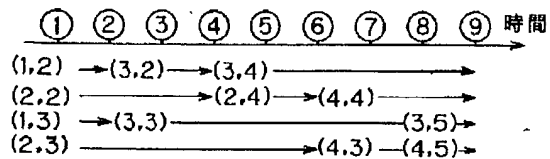
[Drawing 2]

本発明の一実施例の動作説明図

(A)

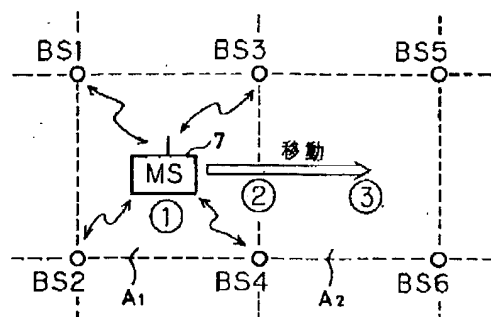


(B)



[Drawing 3]

従来の無線回線制御方法の一例の説明図



[Translation done.]